CURRENT CLAIMS

A copy of the claims is provided for the convenience of the Examiner. The claims are not amended.

1.   (Previously Presented)   A method, comprising:

identifying one or more operating characteristics associated with a valve;

identifying one or more indicators of a possible defect in the valve at a plurality of resolution levels using at least one of the one or more operating characteristics;

generating a plurality of indexes associated with the resolution levels, the indexes based on the one or more indicators and each identifying a likelihood of a valve defect;

selecting one of the plurality of resolution levels using at least one of the indexes; and

determining an overall probability of a valve defect using at least one of the indexes that is associated with the selected resolution level.

2.   (Original)   The method of Claim 1, wherein:

the one or more operating characteristics comprise at least one of measurements of a process variable associated with operation of the valve and values generated to control the operation of the valve; and

the one or more indicators comprise at least one of jumps in the process variable measurements and extreme positions in the generated control values.

3.   (Original)   The method of Claim 2, wherein:

the process variable measurements comprise measurements of a flow rate of one or more

materials flowing through the valve; and

the generated control values comprise values used to adjust an opening of the valve and

thereby adjust the flow rate.

4.   (Original)   The method of Claim 2, wherein identifying the one or more

indicators at the plurality of resolution levels comprises:

performing wavelet decomposition on the process variable measurements to generate

wavelet coefficients at the plurality of resolution levels;

grouping the wavelet coefficients at different resolution levels into groups; and

identifying the jumps in the process variable measurements at the plurality of resolution

levels using the groups of wavelet coefficients.

5.   (Original)   The method of Claim 4, wherein identifying the one or more

indicators at the plurality of resolution levels further comprises identifying the extreme positions

in the generated control values using a number of jumps in the process variable measurements at

each of the resolution levels.

6.   (Original)   The method of Claim 1, wherein generating the plurality of indexes comprises:

using the one or more indicators to identify one or more stiction events at each of the resolution levels, each stiction event comprising a stick phase and a slip phase; and

generating the plurality of indexes using at least one of the one or more stiction events, the stick phase of the one or more stiction events, and the slip phase of the one or more stiction events.

7.   (Original)   The method of Claim 1, wherein selecting one of the resolution levels comprises selecting the resolution level having the indexes resulting in a highest likelihood of a valve defect.

8.   (Original)   The method of Claim 1, wherein:

generating the plurality of indexes comprises identifying multiple sets of one or more stiction events using different operating characteristics and generating multiple sets of indexes using the sets of stiction events; and

determining the overall probability of a valve defect comprises determining a plurality of probabilities associated with the sets of indexes and using the plurality of probabilities to determine the overall probability.

9.   (Previously Presented)   An apparatus, comprising:

a memory operable to store one or more operating characteristics associated with a valve; and

one or more processors collectively operable to:

identify one or more indicators of a possible defect in the valve at a plurality of resolution levels using at least one of the operating characteristics;

generate a plurality of indexes associated with the resolution levels, the indexes based on the one or more indicators and each identifying a likelihood of a valve defect;

select one of the plurality of resolution levels using at least one of the indexes; and

determine an overall probability of a valve defect using at least one of the indexes that is associated with the selected resolution level.

10.   (Original)   The apparatus of Claim 9, wherein:

the one or more operating characteristics comprise at least one of measurements of a process variable associated with operation of the valve and values generated to control the operation of the valve; and

the one or more indicators comprise at least one of jumps in the process variable measurements and extreme positions in the generated control values.

11. (Original) The apparatus of Claim 10, wherein the one or more processors are collectively operable to identify the one or more indicators at the plurality of resolution levels by:

performing wavelet decomposition on the process variable measurements to generate wavelet coefficients at the plurality of resolution levels;

grouping the wavelet coefficients at different resolution levels into groups;

identifying the jumps in the process variable measurements at the plurality of resolution levels using the groups of wavelet coefficients; and

identifying the extreme positions in the generated control values using a number of jumps in the process variable measurements at each of the resolution levels.

12. (Original) The apparatus of Claim 9, wherein the one or more processors are collectively operable to generate the plurality of indexes by:

identifying one or more stiction events at each of the resolution levels using the one or more indicators, each stiction event comprising a stick phase and a slip phase; and

generating the indexes using at least one of the one or more stiction events, the stick phase of the one or more stiction events, and the slip phase of the one or more stiction events.

13. (Original) The apparatus of Claim 9, wherein the one or more processors are collectively operable to select one of the resolution levels by selecting the resolution level having the indexes resulting in a highest likelihood of a valve defect.

14.   (Original)   The apparatus of Claim 9, wherein:

the one or more processors are collectively operable to generate the plurality of indexes by identifying multiple sets of one or more stiction events using different operating characteristics and generating multiple sets of indexes using the sets of stiction events; and

the one or more processors are collectively operable to determine the overall probability of a valve defect by determining a plurality of probabilities associated with the sets of indexes and using the plurality of probabilities to determine the overall probability.

15.   (Previously Presented)   A computer program embodied on a computer readable medium and operable to be executed by a processor, the computer program comprising computer readable program code for:

identifying one or more indicators of a possible defect in a valve at a plurality of resolution levels using at least one of one or more operating characteristics associated with the valve;

generating a plurality of indexes associated with the resolution levels, the indexes based on the one or more indicators and each identifying a likelihood of a valve defect;

selecting one of the plurality of resolution levels using at least one of the indexes; and

determining an overall probability of a valve defect using at least one of the indexes that is associated with the selected resolution level.

16.   (Original)   The computer program of Claim 15, wherein:

the one or more operating characteristics comprise at least one of measurements of a process variable associated with operation of the valve and values generated to control the operation of the valve; and

the one or more indicators comprise at least one of jumps in the process variable measurements and extreme positions in the generated control values.

17.   (Original)   The computer program of Claim 16, wherein the computer readable program code for identifying the one or more indicators at the plurality of resolution levels comprises computer readable program code for:

performing wavelet decomposition on the process variable measurements to generate wavelet coefficients at the plurality of resolution levels;

grouping the wavelet coefficients at different resolution levels into groups;

identifying the jumps in the process variable measurements at the plurality of resolution levels using the groups of wavelet coefficients; and

identifying the extreme positions in the generated control values using a number of jumps in the process variable measurements at each of the resolution levels.

18.   (Original)   The computer program of Claim 15, wherein the computer readable program code for generating the plurality of indexes comprises computer readable program code for:

identifying one or more stiction events at each of the resolution levels using the one or more indicators, each stiction event comprising a stick phase and a slip phase; and

generating the indexes using at least one of the one or more stiction events, the stick phase of the one or more stiction events, and the slip phase of the one or more stiction events.

19.   (Original)   The computer program of Claim 15, wherein the computer readable program code for selecting one of the resolution levels comprises computer readable program code for selecting the resolution level having the indexes resulting in a highest likelihood of a valve defect.

20. (Original) The computer program of Claim 15, wherein:

the computer readable program code for generating the plurality of indexes comprises computer readable program code for identifying multiple sets of one or more stiction events using different operating characteristics and generating multiple sets of indexes using the sets of stiction events; and

the computer readable program code for determining the overall probability of a valve defect comprises computer readable program code for determining a plurality of probabilities associated with the sets of indexes and using the plurality of probabilities to determine the overall probability.

21. (Original) The computer program of Claim 15, further comprising computer readable program code for classifying the overall probability into one of a plurality of classifications.

22.   (Previously Presented)   A system, comprising:

a valve;

a measuring device operable to generate measurements of a process variable associated with operation of the valve;

a controller operable to generate output values for adjusting the valve based on the process variable measurements; and

a defect detector operable to:

identify one or more indicators of a possible defect in the valve at a plurality of resolution levels using at least one of the process variable measurements and the output values;

generate a plurality of indexes associated with the resolution levels, the indexes based on the one or more indicators and each identifying a likelihood of a valve defect;

select one of the plurality of resolution levels using at least one of the indexes; and

determine an overall probability of a valve defect using at least one of the indexes that is associated with the selected resolution level.

23.   (Original)   The system of Claim 22, wherein the defect detector forms part of the controller.

24.   (Original)   A method, comprising:

identifying one or more operating characteristics associated with a valve;

identifying one or more indicators of a possible defect in the valve using at least one of the one or more operating characteristics;

identifying one or more stiction patterns using the one or more indicators;

generating one or more indexes associated with one or more of the stiction patterns and each identifying a likelihood of a valve defect; and

determining an overall probability of a valve defect using at least one of the one or more indexes.